



# 1. Introduction

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## 1.1 Purpose and Scope of the Design Report

## 1.2 Site Background

## 1.3 Previous Studies of the Former Plainwell Impoundment

It is because of the history described in the previous section that that former Plainwell Impoundment has been the focus of an extensive series of investigations. The nature and extent of PCBs within the impoundment was investigated in a systematic way during the RI/FS field work conducted across the Superfund Site in 1993 and 1994. Results of that effort were reported primarily in *Technical Memorandum 12 – Former Impoundment Sediment and Geochronologic Dating Investigation* (Blasland, Bouck & Lee, Inc. [BBL], 1994a), with some additional floodplain data presented in *Technical Memorandum 2 – Results of Phase I TBSA Soil Sampling* (BBL, 1994a). Prior to the RI/FS, the MDNR had collected analytical and characterization data, which were reported in the *Interim Remedial Action for Portions of the Kalamazoo River System – Conceptual Design Technical Memorandum* (GZA Donohue, 1990). In 2000, all available analytical and physical characterization data collected to date were summarized and assessed in the *Draft Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study* (RI/FS Report; BBL, 2000a). Additional data were presented in the *Supplement to the Kalamazoo River RI/FS –Phase I* (Supplement Report; BBL 2000b), as well as the subsequent 2001 update to the RI report titled *PCB in the Kalamazoo River – Update for Decision Makers* (BBL, 2001). In 2001, EPA conducted additional focused sampling of sediments and soils in the former impoundment, and the results were presented in the *Removal Assessment Report for Allied Paper Kalamazoo River Site, Otsego/Plainwell, Michigan* (Weston, 2002). A survey of river bank profiles and collection of riverbank soil PCB data were performed in 2003 and reported in the *Former Plainwell Impoundment Bank Characterization Technical Memorandum* (BBL, 2003). The most recent PCB data were generated from pre-design sediment sampling conducted by BBL in 2006. A variety of pre-design studies have also been conducted in 2005 and 2006 to further characterize, for example, site topography, bank stability/disposition, flow hydrodynamics, equipment accessibility, and habitat quality. These pre-design studies are summarized within this TCRA report and its attachments.

The following subsections briefly summarize the results of these previous studies, which are organized by channel (i.e., submerged) sediments, bank soils, and floodplain soils (i.e., exposed former sediments). Refer to

the RI/FS Report (BBL, 2000a), the Supplement Report (BBL, 2000b), and other relevant documents for additional detail, data summaries, and background information.

### **1.3.1 Sediment**

During the 1993 and 1994 RI field work, approximately 125 submerged sediment samples were collected from within the channel of the former Plainwell Impoundment. Total PCB concentrations ranged from not detected to 139 milligrams per kilogram (mg/kg).

In 2001, EPA conducted a Phase I sampling program, and collected 53 sediment samples whose total PCB concentrations ranged from not detected (55% of samples) to 33 mg/kg (Weston, 2002). During Phase II sampling, EPA collected an additional 160 sediment samples from around sample location SD004, which is approximately 1,500 feet upstream of the Plainwell Dam. The results of this effort showed total PCB concentrations ranging from not detected (80% of samples) to 4.2 mg/kg; 99% of the samples had total PCB concentrations of less than 1.0 mg/kg (Weston, 2002). In 2006, BBL collected 222 sediment samples, and the total PCB concentration ranged from not detected to 220 mg/kg.

Prior to the 2006 sediment sampling, PCBs were not detected in any mid-channel sediment samples at concentrations greater than 1.0 mg/kg – samples with PCB concentrations greater than 1.0 mg/kg from all previous investigations were detected within 40 feet of the shore. However, as a result of BBL's 2006 sediment sampling, three specific mid-channel sediment deposits were identified as containing PCB concentrations greater than 50 mg/kg. For purposes of this TCRA, these three sediment deposits have been designated as Mid-Channel Removal Areas A, B, and C. These deposits were further delineated during pre-design studies to determine their spatial extent (see Section 2.1).

### **1.3.2 Bank Soils**

Physical characterization assessments performed during the 1993 and 1994 RI field work revealed that the riverbanks within the three former impoundments were unstable in many locations and therefore susceptible to erosion. This ongoing, uncontrolled erosion is the single largest source of PCB loading to the Kalamazoo River, as PCB-containing bank materials slough off the banks to be deposited in the river or transported downstream (BBL, 2000a). The extent and rates of erosion have been estimated based on more than two years of

measurements developed using erosion pins, which were placed in the banks in 2000. The results of this work have been documented in three erosion pin monitoring reports (BBL, June 2001; BBL, March 2002; BBL, January 2003). BBL has generated further evidence of erosion through the comparison of 1993 transects and a 2003 survey of 74 bank profiles (placed at 100-foot intervals), each of which was used to demarcate bank slope, top of bank, toe of bank, and bank cross-sections (BBL, 2003). Additional probing and survey data have been collected during the pre-design studies conducted in 2005/06 in support of the development of this Design Report.

Results from the 87 top-of-bank soil samples collected during the 2003 bank characterization study (BBL, 2003) indicate total PCB concentrations in these soils range from 0.20 mg/kg to 120 mg/kg. When combined with data from similar locations collected during the 1993/94 RI field work, the arithmetic average total PCB concentration in bank soils was 23 mg/kg, and the median concentration was 13 mg/kg (BBL, 2003). These combined data also indicate that PCB concentrations are greater in soils near the river channel, and concentrations decrease with distance from the river (BBL, 1994b; BBL, 2000a; BBL, 2003). As described in Section 2.1, these data provide a basis for the delineation of near-shore sediment and bank soil removal areas targeted for the TCRA. Similarly, bank characterization studies, stability analyses, and habitat assessments have provided a basis for optimizing appropriate post-removal restoration conditions such as bank height, bank slope, and habitat characteristics.

### **1.3.3 Floodplain Soils**

The floodplain soils adjacent to the Kalamazoo River and lying within the former Plainwell Impoundment are comprised of approximately 75 acres of former sediments (about 3.8 feet thick) that were exposed after MDNR drew down the impoundment in the early 1970s and dismantled the Plainwell Dam to its sill level in 1987. Today, these upland floodplain soils are relatively stable and covered with vegetation, except along the banks of the river where the soils are subject to undercutting and erosion, causing them to slough off into the river.

During the RI field work, BBL collected 135 floodplain soil samples that had total PCB concentrations ranging from not detected to 85 mg/kg, with an overall average concentration of 8.9 mg/kg (BBL, 1994a; BBL, 1994b; BBL, 2000a). PCB concentrations were generally found to decrease with depth, and concentrations in subsurface soils tended to decrease with distance from the river. In 2001, EPA collected 147 floodplain soil samples (Phase I), which ranged in total PCB concentration from not detected (17% of samples) to 84 mg/kg; 61% of samples had concentrations of less than 1.0 mg/kg (Weston, 2002). EPA conducted Phase II soil

sampling in three locations referred to as Grid 1 (218 samples around Sampling Location [SL] 015), Grid 2 (235 samples around SL029), and Grid 6 (159 samples around SL012). Total PCB concentrations in the Phase II samples ranged from not detected to 158 mg/kg in Grid 1, from not detected to 45.3 mg/kg in Grid 2, and from not detected to 65.6 mg/kg in Grid 6 (Weston, 2002). As described in Section 2.1, these data provide a basis for the delineation of specific floodplain soil removal areas, each containing soils with PCB concentrations greater than 50 mg/kg and subject to removal during the TCRA.

#### **1.4 Removal Action Objectives and Summary of Work to Be Performed**

#### **1.5 Design Report Organization**